

PALEONTOLOGY.—*New genera of Early Cretaceous ammonites from California and Oregon.* RALPH W. IMLAY,¹ U. S. Geological Survey.

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Studies of Early Cretaceous (Valanginian-Hauterivian) ammonites from the West coast of the United States have demonstrated that some of the ammonites belong to new genera. These are validated herein in order that their names may be used in the near future in stratigraphic papers now being prepared by geologists of the U. S. Geological Survey and of the Oregon Department of Geology and Mineral Resources.

Family BERRIASSELLIDAE Spath

Subfamily NEOCOMITINAE Spath

Hannaites Imlay, n. gen.

Hannaites is characterized by fairly tight coiling of whorls of small to medium size; a compressed, subquadrate whorl section; a truncated venter; a vertical umbilical wall; flexuous ribs that tend to fade out on the lower parts of the flanks; strong forwardly arched ribs on the venter; backwardly inclined umbilical tubercles; spirally elongated ventral tubercles at the ventral shoulder; a body chamber that tends to retract from the remainder of the shell; many shallow constrictions; appreciable variation in the strength of ribs and tubercles; and a fairly short, narrow, slightly asymmetrical first lateral lobe. The type species is *Neocomites riddlensis* Anderson (1938, p. 167, pl. 30, figs. 1-4).

Hannaites greatly resembles *Leopoldia* (Baumberger, 1906, pp. 28-47) in lateral view but differs by having a flatter venter, sharply defined ventral shoulders, continuous strong ribbing across the venter, considerable variation in the strength of its ornamentation, the presence of constrictions in adults, and the tendency of its body chamber to become scaphitoid. Also, the suture line appears to have a much narrower first lateral lobe than that of *Leopoldia*.

Hannaites is named in honor of G. Dallas Hanna, of the California Academy of Sciences.

Hannaites has to date been found only in Oregon in beds of early to middle Hauterivian age.

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Family OLCOSTEPHANIDAE Haug

Subfamily POLYPTYCHITINAE Spath

Wellsia Imlay, n. gen.

Wellsia bears many resemblances to the genus *Necraspedites* (Spath, 1923, p. 17) based on *Craspedites semilaevis* V. Koenen (1902, p. 80, pl. 5, figs. 8-10). It differs by its ribs being arched forward more strongly on the venter and somewhat reduced in strength along the mid-ventral line, by its umbilical swellings disappearing at an earlier growth stage, by its venter being more narrowly rounded, and by its umbilicus being slightly smaller. The type species is designated as *Dichotomites oregonensis* Anderson (1938, p. 159, pl. 30, fig. 5). The genus likewise includes *Lyticoceras packardi* Anderson (1938, p. 164, pl. 31, figs. 2-5).

It is named in honor of Francis G. Wells, of the U. S. Geological Survey, in recognition of his important contributions to the geologic knowledge of Oregon and California.

Wellsia has been found only in Oregon in beds of early Hauterivian age directly overlying beds containing the pelecypod *Aucella crassicolis* Keyserling and the ammonites *Olcostephanus*, *Sarasinella*, and *Thurmanniceras*.

Hertleinia Imlay, n. gen.

This genus has a moderately compressed shell, subquadrate whorl section, and a moderately arched venter. The umbilicus widens during growth from fairly narrow to fairly wide. The umbilical wall is low and vertical. The ornamentation consists of strong primary ribs that curve backward on the umbilical wall, curve forward on the lower two-fifths of the flanks and then divide into two weaker secondary ribs that continue the forward inclination of the primary ribs. One, or both, secondary ribs of each pair bifurcate between the middle and the upper third of the flanks. A few ribs begin freely near the middle of the flanks. The ribs continue across the venter without diminution in strength and with a gentle forward arching. Many shallow constrictions occur on each whorl. The suture

line is characterized by having long, rather slender lobes.

Neocraspedites aguila Anderson, 1938, p. 156, pl. 25, figs. 1-3, pl. 68, fig. 4) is designated as the type species. The genus, also, includes *N. rectoris* Anderson (1938, p. 157, pl. 23, fig. 2) and *N. signalis* Anderson (1938, p. 157, pl. 26, fig. 1).

The genus is named in honor of Leo G. Hertlein, of the California Academy of Sciences.

Hertleinia is distinguished from *Neocraspedites* in which its species were placed by Anderson (1938, p. 156, 157) by its shell being much more evolute in the adult, by its ribs persisting on the middle of the flanks, and by its ribs arching forward much less strongly on the venter. *Hertleinia* differs from *Craspedodiscus* Spath (1924, p. 77) by becoming more evolute during growth, by its venter remaining moderately broad in the adult instead of becoming narrow, by retaining ribbing on its flanks in the adult, and by the ribs being much less strongly arched on venter.

Hertleinia has been found only in California associated with species of *Hoploceroceras* a few hundred feet above beds containing *Simbirskites* of middle Hauterivian age and many hundreds of feet below an occurrence of the Barremian ammonite *Pulchellia*. Its age is considered to be only slightly younger than that of *Simbirskites* and, therefore, late Hauterivian.

Subfamily SIMBIRSKITINAE Spath

Hollisites Imlay, n. gen.

This genus has a stout to fairly stout shell, moderately evolute coiling, regular bifurcating ribs on its inner whorls, virgatoid ribs on its outer whorls, and a suture line characterized by a fairly wide first lateral lobe. *H. lucasi* Imlay, n. sp. is designated as the type species.

Immature specimens of *Hollisites* have perisphinctoid ribbing similar to that on small specimens of the genus *Spectoniceras* (Spath, 1924, p. 76) from England (Danford, 1906, pl. 12, fig. 3) and Russia (M. Pavlow, 1886, pl. 1, figs. 4, 5; A. Pavlow, 1891, pl. 15(8), figs. 3a-c; pl. 18 (11), figs. 12, 14), differing mainly by losing their lateral tubercles at a very small size. Adult specimens of *Hollisites* differ from the adults of *Spectoniceras* (M. Pavlow, 1886, pl. 1, fig. 1, p. 2, figs. 1a, b; A. Pavlow, 1891, pl. 18(11), fig. 13a; Karakasch, 1907, pl. 13, fig. 4a) by being more involute, by acquiring weaker, denser, virgatoid ribbing, and by lacking tubercles at the points of rib furcation. The branching of the ribs at

various heights above and below the middle of the flanks is in striking contrast to the regular bifurcation of the ribs on adults of *Spectoniceras*.

Among Eurasian species *Hollisites* probably includes "*Simbirskites*" *auerbachii* Eichwald (1868, p. 1092, pl. 34, figs. 9c-d; Karakash, 1907, p. 130, pl. 13, figs. 1a, b, 5a, b, pl. 24, figs. 30, 31) from the Crimea and "*Perisphinctes*" *koeneni* Neumayr and Uhlig (1881, p. 18, pl. 21, figs. 1, 1a) from Germany.

Hollisites is named in honor of Hollis M. Dole, State geologist of Oregon.

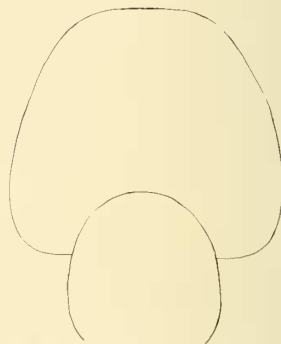


FIG. 1.—Whorl section of *Hollisites lucasi* Imlay, n. sp., near adoral end of holotype at diameter of 170 mm. $\times 1\frac{1}{2}$.

Hollisites has been found in Oregon associated with the ammonite *Simbirskites* of middle Hauterivian age. In California it occurs with, or slightly below, *Hertleinia aguila* (Anderson) of late Hauterivian age. The large fragment named *Polyptychites hesperius* Anderson (1938, p. 154, pl. 24, figs. 1, 2) probably belongs to *Hollisites* and was found at the same locality as *Simbirskites broadi* Anderson (1938, p. 155, pl. 22, figs. 2, 3). Judged from these occurrences, *Hollisites* is of middle to late Hauterivian age.

Hollisites lucasi Imlay, n. gen.

The holotype is entirely septate, and the body chamber is unknown. At the beginning of the outermost whorl of the holotype the whorl section is ovate and as wide as high. At the adoral end the whorl is a little wider than high. The outer whorl embraces about half of the preceding whorl. The flanks are gently convex and the venter is evenly rounded. The umbilicus is moderate in width and fairly shallow. The umbilical wall is vertical, fairly low, and rounds abruptly into the flanks.

The ribbing on a small specimen and on the inner whorls of a paratype is perisphinctoid. The

primary ribs curve backward on the umbilical wall, incline forward on the flanks, and bifurcate regularly at the middle of the flanks. The secondary ribs incline forward more strongly than the primary ribs and arch forward gently on the venter. The furcation points are swollen but not tuberculate. Toward the adoral end the ribbing tends to become flexuous and at two places is virgatous. Constrictions are common.



FIG. 2.—Suture lines of *Hollisites lucasi* Imlay, n. sp., drawn from holotype near adoral end. $\times \frac{1}{2}$.

The ribbing on the outer whorl of the paratype, just mentioned, and on the holotype is mostly virgatous. The primary ribs bifurcate at about two-fifths of the height of the flank and then the posterior rib of each pair of secondary ribs bifurcates again at about three-fifths of the height of the flanks. The secondary ribs are appreciably weaker than the primary ribs, are inclined forward more strongly on the flanks, and arch forward gently on the venter. Eight constrictions occur on half a whorl. Toward the adoral end of the holotype more of the secondary ribs bifurcate above the middle of the flank and some secondary ribs arise freely near the middle of the flanks.

The holotype at a diameter of 170 mm has a whorl height of 67 mm, a whorl thickness of 69 mm, and an umbilical width of 58 mm.

The suture line greatly resembles that of *Hertleinia aguila* (Anderson) (1938, pl. 25, fig. 2, pl. 68, fig. 4) in general plan. It differs mainly by having a broader first lateral lobe.

H. lucasi Imlay, n. sp. greatly resembles "*Simbirskites*" *auerbachii* Eichwald (Karakasch, 1907, p. 130, pl. 13, figs. 1a, b, 5a, b) from the Crimea in plan of ribbing and in suture line. It differs by having more virgatous ribs and a somewhat broader venter. Its rib pattern is similar to that of "*Perisphinctes*" *koeneni* Neumayr and Uhlig (1881, p. 18, pl. 21, figs. 1,

1a) from Germany, but it differs by having much stouter whorls and broader sutural lobes.

Hollisites lucasi Imlay, n. sp. is named for Larry Lucas of Agness, Oregon, who collected the holotype specimen on the south side of the Rogue River $1\frac{1}{2}$ miles below Agness, Curry County, Oregon. Its age is probably middle Hauterivian because from the same general location have been found specimens of *Hannaites riddlensis* (Anderson), *Simbirskites*?, and *Hoplocrioceras*. The paratypes were obtained at USGS Mes. loc. 1092 in association with, or just below, *Hertleinia aguila* (Anderson) which is considered to be of late Hauterivian age.

Holotype: U.S.N.M. 129045; paratypes: U.S. N.M. 129044. The paratypes were collected at U.S.G.S. Mes. loc. 1092, which is about half a mile northeast of the buildings at the Wilcox Ranch, Tehama County, Calif. Stratigraphically they occur about 200 feet above the top of the sandy beds containing *Aucella crassicolis* Keyserling.

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